Geriatric Nursing 36 (2015) 445–450

Contents lists available at ScienceDirect

Geriatric Nursing

journal homepage: www.gnjournal.com

Feature Article

Homebound older adults: Prevalence, characteristics, health care utilization and quality of care

Shirley Musich, PhD [a,*], Shaohung S. Wang, PhD [a], Kevin Hawkins, PhD [a], Charlotte S. Yeh, MD [b]

[a] Advanced Analytics, Optum, 315 E. Eisenhower Parkway, Suite 305, Ann Arbor, MI 48108, USA
[b] AARP Services, Inc., 601 E. Street, N.W., Washington, D.C. 20049, USA

ARTICLE INFO

Article history:
Received 7 May 2015
Received in revised form
19 June 2015
Accepted 29 June 2015
Available online 6 August 2015

Keywords:
Homebound
Health care utilization
Health care expenditures
Quality of care

ABSTRACT

The purpose of this study was to estimate prevalence rates of homebound older adults, their characteristics and the impact of homebound status on health care utilization, expenditures and quality of medical care measures. Surveys were sent to new enrollees ($n = 25{,}725$) in AARP® Medicare Supplement plans (insured through UnitedHealthcare) to screen for serious chronic conditions, ambulatory disabilities and eligibility for care coordination programs. Health care utilization and expenditures were determined from paid claims. Member-level quality measures considered compliance with medication adherence and care patterns. Among survey respondents, 19.6% were classified as being homebound. The strongest predictors of being homebound included serious memory loss, being older, having more chronic conditions, taking more prescription medications and having multiple hospitalizations. Homebound had significantly higher health care utilization and expenditures. Homebound were more likely to be noncompliant with medication adherence and care pattern rules. Ongoing screening and subsequent interventions for new enrollees classified as homebound may be warranted.

Introduction

Homebound older adults are an understudied population that often lives with functional disabilities, multiple medical comorbidities, depression and cognitive impairment.[1–3] This population, often isolated from emotional and social support,[4] is vulnerable and at significant risk for decreased quality of life, increased medical complications, loss of independent living and mortality.[3–5] Yet homebound older adult populations have received minimal programmatic attention, even as numbers of disabled older adults continue to increase and the demand for home care services continues to grow.[6]

In the US, homebound status is generally defined consistent with Medicare home care benefits. These criteria have become more restrictive over time and currently consider those eligible for benefits according to extent of ambulatory disability (e.g., severe), diagnoses of medical or injury episode and need for intermittent skilled care (e.g., nurse, physical therapist).[7] The Medicare home care benefits program is coordinated by a physician's referral and treatment plan and delivered by Medicare-approved home care agencies. Research studies in the US focused on homebound older adults generally recruit study populations through the agencies delivering home-based services (e.g., Meals on Wheels), but not necessarily using Medicare home care criteria.[4,5,8–13] Consequently, population screening has not been utilized and estimates of prevalence rates for homebound older adults are difficult to determine. Based on 2012 US Census Bureau reports, 23.5% (9.2 million) of 65-year and older adults characterized themselves as having ambulatory disabilities (e.g., difficulty walking or climbing stairs).[14] Medicare only serves about 3 million of these older adults with documented (by the physician) ambulatory disabilities and medical health needs.[6]

In other countries (e.g., Israel, Japan), homebound among older adults (65 years and older) are more generally defined from a screening survey question querying how many times a person leaves the home.[15–17] Responses indicating leaving one time a week or less are defined as being homebound and have been validated as a good predictor of incident disability of physical function.[17] This broader identification of homebound older adults includes those with both physical and mental conditions (e.g., cognitive impairment) that limit one's ability to leave home.[17] Given various levels of restrictions in screening for homebound older adult research studies, the

Conflicts of interest: None.

* Corresponding author. Tel.: +1 248 626 0082.
E-mail address: shirley.musich@optum.com (S. Musich).

http://dx.doi.org/10.1016/j.gerinurse.2015.06.013

prevalence of homebound among older adults in these countries has been estimated at about 10%–20% of the population.[15–17]

Characteristics associated with homebound older adults include demographics (e.g., older, female, lower income/education),[4,15,16] poorer health status (e.g., more comorbidities requiring more medications),[13,15,16,18,19] lower functional status (e.g., more ADLs/IADLs, mobility, hearing and vision problems)[5,15,16] and poorer mental health (e.g., depression, loneliness and anxiety).[1,4,13,15,16,20] High levels of depression, anxiety and cognitive impairment lead to higher likelihoods of noncompliance with treatment plans and/or medication adherence.[21,22]

The inability to keep appointments or pursue follow-up care plans with multiple physicians results in fragmented health care delivery[23] and a lack of care coordination across multiple chronic conditions. The consequences of this system are manifested in high utilization of emergency room visits—as high as 68% in low-income homebound older adults.[24] The combination of functional disability with multiple conditions is especially detrimental and leads to elevated use of emergency room visits, hospitalizations and, consequently, higher health care expenditures.[25] Homebound older adults are often among the top 5% of highest utilizers of medical services with persistently high medical expenditures over time.[25]

Home care agencies and programs serving homebound older adults tend to be focused on medical and physical issues[12,18] including delivery of meals (e.g., Meals on Wheels), home-based medical care (e.g., medical services delivered to the home by physicians and/or nurses)[13,18,21] or rehabilitation (e.g., physical therapy, speech therapy, occupational rehabilitation). Few services focus on mental health needs of homebound older adults despite known high levels of depression and anxiety or cognitive impairment.[3,9,12] Intervention programs to address mental health issues are hampered by insufficient clinical resources, functional inability for patients to keep appointments and lack of diagnosis and referral patterns for mental health issues.[1,3]

Most of the literature examining homebound older adults has focused on Medicare populations in the US or older adult populations in other countries. We found no studies investigating the prevalence of homebound and its consequences among older adults with Medicare Supplement plans (i.e., Medigap). While most (about 90%) of those with original fee-for-service Medicare coverage have some type of supplemental insurance coverage, about 28% (currently about 10.2 million adults) have purchased Medigap coverage.[26] Few studies in the US have investigated the prevalence of those with ambulatory disabilities or detailed their characteristics and/or the outcomes associated with these disabilities. To address these gaps in scientific knowledge, considering the steady increase in Baby Boomers aging into Medicare and Medicare Supplement plans, it was of particular of interest to understand the magnitude of disability issues (i.e., prevalence and medical ramifications) among new enrollees to AARP Medicare Supplement plans.

Thus, the primary objective of our study was to document the prevalence of homebound older adults among new enrollees to AARP Medicare Supplement plans and determine characteristics associated with homebound status. The secondary objective was to examine the impact of homebound status on the individual's 1) health care utilization (i.e., inpatient admissions and emergency room visits); 2) medical and prescription drug expenditures; and 3) medication and care pattern compliance (i.e., quality of care measures).

Methods

Sample selection

In 2013, approximately 3.5 million Medicare insureds were covered by an AARP® Medicare Supplement plan insured by UnitedHealthcare Insurance Company (for New York residents, UnitedHealthcare Insurance Company of New York). These plans are offered in all 50 states, Washington DC and various US territories. From January 2012 through December 2014, new enrollees to AARP Medicare Supplement plans in five states (California, Florida, North Carolina, New York and Ohio) were surveyed to screen for at-risk populations with self-reported intensive health needs (e.g., multiple chronic conditions, cognitive impairment, disabilities and multiple hospitalizations). New enrollees during this time period included 1) insureds 65 years and older and 2) disabled insureds 64 years and under qualified for Medicare benefits. To be eligible for this prospective cross-sectional study, survey respondents were required to have a minimum of six months of Medicare Supplement plan eligibility post-survey completion and to be enrolled in an AARP Medicare Rx prescription drug plan. The final study sample included 25,725 survey respondents.

Survey

The short initiation survey (17 questions) was developed and validated in 2005/2006 by UnitedHealthcare to screen insureds for poor health status, cognitive impairment, frailty and probability for repeated admissions. The survey, designed as a single-page questionnaire, was adapted for use in screening new enrollees (with no medical claims history) about current health status and potential eligibility for existing care coordination services. Eligibility for programs was based on responses to selected questions on the survey, including existing chronic conditions, past hospitalizations, cognitive impairment and/or disability status.

Homebound characterized as self-reported ambulatory disability were identified by answering "yes" to any of the questions in Table 1.

These criteria are consistent with Medicare requirements for levels of ambulatory disabilities (i.e., requiring assistive devices or the help of another person to get around outside of one's home) but eligibility for Medicare home care benefits require additional physician-documented medical/injury episodes of care and subsequent intermittent skilled care needs. Our purpose in this study was to consider the broader impact of ambulatory disabilities without the restriction of additional medical needs.

Table 1
Survey questions assessing ambulatory disabilities used to identify homebound older adults.

Homebound disabilities	Eligible new enrollees	Homebound older adults
	25,725 (%)	5043 (%)
Have trouble getting around at home or outside your home?	14.7	74.8
Use a cane, wheelchair or walker to move around at home or outside your home?	13.9	70.7
Need the help of another person to move around inside or outside your home?	5.1	26.1
Need to stay in the house most or all of the time?	4.0	20.5
Need to stay in bed most or all of the time?	2.2	11.0
Total homebound older adults	**19.6%**	**100%**

Survey respondents were considered homebound if they answered yes to any of these five questions.

Health care utilization and expenditures

Health care utilization was defined from medical claims as an inpatient admission or emergency room visit within the first year of enrollment in the AARP Medicare Supplement plan. Health care expenditures were defined as paid claims for the first year of enrollment aggregated from Medicare, Medicare Supplement and patient out-of-pocket paid amounts. Prescription drug expenditures included AARP Medicare Rx paid claims and patient copayments.

Quality of care measures: medication and care pattern compliance

Member-level medication and care pattern compliance were used as quality of care measures based on the evidence-based recommendations of care (i.e., medications and care patterns) for member chronic conditions. Care patterns included annual physician visits for those with chronic conditions, along with recommendations for preventive care (e.g., regular monitoring of biometric values with lab tests, diabetic vision and foot examinations, etc.). Survey respondents were linked to Evidence-Based Medicine (Symmetry EBM Connect® Version 8.3) software. This software program was developed to calculate compliance with medications from pharmaceutical claims and care patterns from health care claims using a defined set of rules for evidence-based care associated with various chronic conditions. Ten common primary chronic conditions (asthma, coronary artery disease, chronic obstructive pulmonary disease, congestive heart disease, depression, diabetes, hypertension, hyperlipidemia, osteoporosis and rheumatoid arthritis) were included in this analysis. To be considered "compliant," individuals must have been compliant with recommended medications (at least 80% compliant) or compliant with care patterns (yes/no) by chronic condition category assessed for the first year after enrollment. We counted the number of medications or care patterns for which each individual was noncompliant across all categories of his or her chronic conditions (e.g., heart disease, diabetes, depression, etc.).

Measures

Covariates were included to characterize homebound older adults and to adjust for factors that may influence health care utilization, expenditures or quality of care. These covariates included measures of demographics, socioeconomic factors, health status and other characteristics taken from health plan eligibility and claims files.

Demographics

Demographic questions included age and gender. Age groups were defined as: <64; 64–69; 70–74; 75–79; 80–84; and 85+ years. Those who were 64 years at the time of the survey but subsequently aged up to 65 years before the end of the year were categorized as 64–69. Living in urban and other locations; low, lower middle, upper middle or high income areas; and high, medium or low minority areas were geocoded from zip codes. AARP Medicare Supplement plan types were grouped by cost-sharing levels, including high-level coverage plans with no copayments or deductibles (plans C, F and J), medium-level coverage (plans B, D, E, G, H, I and N) and low-level coverage (plans A, K and L).

Chronic conditions

Chronic conditions self-reported on the survey included: heart disease, heart failure, breathing problems, kidney dialysis, diabetes, depression, other conditions or no conditions. The number of chronic conditions was subsequently grouped into the following categories: 0 conditions, 1 condition, 2 conditions or 3 or more conditions based on the count of the chronic conditions self-reported on the survey.

Prescription drugs and medical utilization

The number of prescription drugs taken by the individual was self-reported on the survey as a continuous variable: how many different prescription drugs do you take each day? The number of prescription drugs was subsequently categorized as: 0 prescription drugs; 1–2 prescription drugs; 3–4 prescription drugs; 5–6 prescription drugs; or 7 or more prescription drugs. Number of hospitalizations within the previous 12 months were reported as 0 times, 1 time, 2–3 times or 4 or more times. Access to care was measured as the number of acute hospital beds per 100,000 in the individual's hospital service area.

Cognitive impairment

Cognitive impairment (memory loss) was determined from a yes response to the survey question: are you being treated or have you been told you have serious memory loss?

Health literacy

Health literacy was measured with the single validated question asking for confidence level in filling out medical forms.[27] The demographic, socioeconomic and health status covariates considered are listed in Table 2.

Statistical models

Characteristics associated with homebound older adults were determined using multivariate logistic regression models for homebound versus non-homebound. Covariates included all of those variables listed in Table 2. Health care utilization and aggregated annual health care expenditures for homebound and non-homebound were determined and regression adjusted for demographic, socioeconomic and health status variables. The impact of homebound status on noncompliance with EBM medication and care patterns was determined and adjusted using multivariate count regression models adjusting for confounding variables. Negative binomial models are commonly used to analyze outcomes, such as event counts, that have positive integer values with skewed distributions.[28]

Results

Overall, 50,623 new enrollees of AARP Medicare Supplement plans in the five states responded to the survey (46.1% response rate) during 2012–2014. Of these, 25,725 (50.8%) met the eligibility criteria for this study: had 6 months of AARP Medicare Supplement insurance follow-up post-survey and had AARP Medicare Rx prescription drug coverage. Survey respondents were mostly female (59.6%), 64–69 years of age (63.3%; 2.3% were <64 years), high income (54.7%), white (48.1%) with 44.1% reporting at least one chronic condition. Among survey respondents, the prevalence of homebound older adults was 19.6% (Table 2).

Characteristics associated with homebound older adults

The strongest predictor of homebound status was self-reported memory loss (Table 3). Other characteristics associated with homebound included being older or younger (75 years or more, under 64 years), having multiple chronic conditions (3 or more) resulting in multiple hospitalizations (2 or more) in the past year and taking many prescription drugs (7 or more). High health

Table 2
Unadjusted demographic characteristics associated with homebound and non-homebound older adults.

Characteristic	Overall	Homebound	Non-homebound	*p*-value
	25,725 (%)	5043 (%)	20,682 (%)	
Age				
Average age	69.4	72.3	68.7	<0.001
< 64	2.3	6.0	1.4	<0.001
64–69	63.3	44.8	67.8	
70–74	14.0	12.6	14.4	
75–79	9.2	11.5	8.6	
80–84	6.2	10.8	5.1	
85 plus	5.1	14.4	2.8	
Gender				
Male	40.4	36.8	41.3	<0.001
Female	59.6	63.2	58.7	
Income (from zip code)				
High	54.7	50.2	55.8	<0.001
Medium	32.6	35.3	32.0	
Low	10.9	12.7	10.5	
Minority status (from zip code)				
Low	48.1	44.4	49.0	<0.001
Medium	44.4	46.4	43.9	
High	5.8	7.4	5.4	
Location				
Urban	89.4	89.1	89.5	0.45
Acute hospital beds per 100,000	248.6	250.3	248.2	0.03
Unhappy				
Very/somewhat unhappy	10.0	20.8	7.4	<0.001
Chronic conditions (self-reported)				
Heart disease	17.2	30.4	14.0	<0.001
Heart failure	4.5	13.2	2.4	<0.001
Breathing problems	10.7	22.4	7.9	<0.001
Kidney dialysis	2.4	8.9	0.8	<0.001
Diabetes	20.5	32.2	17.6	<0.001
Depression	14.0	28.8	10.4	<0.001
Other conditions	88.7	92.9	87.7	<0.001
Number of chronic conditions (self-reported)				
0 conditions	55.9	36.0	60.7	<0.001
1 condition	28.9	30.7	28.5	
2 conditions	9.9	16.3	8.4	
3 or more conditions	5.3	17.1	2.4	
Number of prescription drugs (self-reported)				
0	11.1	7.0	12.1	<0.001
1–2	27.0	13.4	30.3	
3–4	29.2	24.0	30.5	
5–6	17.6	22.2	16.5	
7 or more	12.0	25.7	8.7	
Hospitalizations (self-reported)				
None	81.8	63.4	86.3	<0.001
1 Time	11.2	17.2	9.7	
2–3 Times	4.0	9.4	2.7	
4 or more times	1.8	5.0	1.0	
Memory loss				
Yes	4.7	17.1	1.7	<0.001
Confident filling out medical forms				
Extremely/quite a bit	80.7	64.9	84.6	<0.001
Plan type				
High-level coverage	69.8	71.2	69.5	<0.001
Medium-level coverage	27.7	25.6	28.2	
Low-level coverage	2.5	3.3	2.3	

literacy and taking fewer prescription drugs (indicating better health) were protective against being homebound.

Impact of homebound on health care utilization and expenditures

Health care utilization for inpatient admissions and emergency room visits were significantly higher for homebound compared to non-homebound (Table 4). Inpatient admissions were 56.5% higher and emergency room visits were 22.2% higher for homebound older adults.

Table 3
Significant characteristics associated with homebound status for older adults.

Characteristic	Odds ratio	95% confidence interval	*p*-value
Memory loss	6.68	(5.756, 7.741)	<0.001
Age 85+	6.40	(5.598, 7.319)	<0.001
3+ Chronic conditions	4.43	(3.827, 5.121)	<0.001
Age <64	3.84	(3.163,4.658)	<0.001
4+ Hospitalizations	3.63	(2.911, 4.516)	<0.001
Age 80–84	2.55	(2.245, 2.902)	<0.001
2–3 Hospitalizations	2.55	(2.190, 2.962)	<0.001
Unhappy	2.09	(1.886, 2.313)	<0.001
1 Hospitalization	1.82	(1.645, 2.014)	<0.001
2 Chronic conditions	1.81	(1.612, 2.040)	<0.001
7+ Prescription drugs	1.79	(1.555, 2.051)	<0.001
Age 75–79	1.74	(1.549, 1.960)	<0.001
Female	1.41	(1.305,1.515)	<0.001
1 Chronic condition	1.39	(1.268, 1.512)	<0.001
Minority	1.32	(1.130, 1.550)	0.001
Age 70–74	1.26	(1.127, 1.399)	<0.001
3–4 Prescription drugs	0.81	(0.721, 0.918)	0.001
1–2 Prescription drugs	0.60	(0.525, 0.680)	<0.001
High health literacy	0.53	(0.491, 0.581)	<0.001

Logistic regression models predicting homebound status included all measures listed in Table 2. Only significant predictors ($p < 0.001$) are shown.

Subsequently, overall paid health care expenditures (medical and prescription drug) were 35.2% higher for homebound ($491 per member per month; pmpm) compared to non-homebound. Expenditures for medical and prescription drugs were 36% and 17% higher, respectively, for homebound older adults.

Impact of homebound status on quality of care measures

Homebound older adults were noncompliant with about 15% more of recommended medication protocols compared to non-homebound for the 10 chronic conditions that were monitored (Fig. 1). Likewise, homebound older adults were noncompliant with about 9% more of recommended care patterns associated with those 10 chronic conditions.

Discussion

In our population of new enrollees to AARP Medicare Supplement plans, 19.6% were categorized as homebound. Among these individuals, about 75% indicated having trouble getting around and/or needing assistive devices in order to move around (Table 1). This prevalence rate of homebound older adults is similar to the rates characterized by Cohen-Mansfield et al. (17.7%–19.5%; 2012)[16] among Israeli older adults (75 years and older) and in line with the 23.5% with ambulatory disabilities reported by the US Census Bureau in the US (65 years and older).[14] Similar to other research studies, our homebound older adult population reported high levels of depression (28.8%), chronic conditions (33.4% with 2 or more conditions), prescription drug use (47.9% using 5 or more medications) and hospitalizations (31.6% with at least one hospitalization in the past year).[4,13,15,16,18,19]

The strongest predictor of homebound status was cognitive impairment (self-reported memory loss). Cognitive impairment is independently associated with physical disability.[8] Screening and diagnosis of cognitive impairment among homebound older adults is recognized as an underserved area in the continuum of geriatric care.[29] In our population, 17.1% self-reported memory loss, which is similar to the 17% reported among homebound older adults who were screened using a rapid cognitive screen (the Mini-Cog).[29] Levels of cognitive impairment, however, have been reported as high as 33% depending on the demographics and health status of

Table 4
Unadjusted and adjusted health care utilization and expenditures for homebound and non-homebound older adults.

	Unadjusted			Regression adjusted		
	Homebound	Non-homebound	*p*-value	Homebound	Non-homebound	*p*-value
	5043	20,682		5043	20,682	
Health care utilization						
Any ER visit (annual)	32.5%	20.3%	<0.001	26.4%	21.6%	<0.001
Any IP admission (annual)	24.4%	10.4%	<0.001	18.0%	11.5%	<0.001
Health care expenditures						
Medical paid (pmpm)						
Medicare paid	$1951.62	$907.94	<0.001	$1385.45	$1017.26	<0.001
Medicare supplement paid	$249.49	$128.58	<0.001	$194.48	$139.52	<0.001
Patient paid	$17.47	$16.81	0.04	$16.97	$17.11	0.69
Prescription drug paid (pmpm)						
Medicare supplement paid	$273.12	$143.83	<0.001	$217.20	$159.92	<0.001
Patient paid	$88.34	$56.40	<0.001	$71.05	$60.68	<0.001
Total medical/drug expenditures (pmpm)	**$2580.03**	**$1253.54**	**<0.001**	**$1885.15**	**$1394.49**	**<0.001**

ER = emergency room; IP = inpatient; pmpm = per member per month. Regression adjusted models included those variables listed in Table 2.

the homebound older adult population studied.[8] Early diagnosis and care coordination are especially important as this vulnerable population attempts to self-manage multiple conditions requiring multiple prescription drugs and complex treatment plans.[13,16,20,29]

High levels of depression and anxiety are consistently associated with homebound older adults. While 28.8% in our population self-reported depression, 50% were on antidepressants or had a diagnosis of depression (from claims; data not shown). This is consistent with Choi et al.'s (2012)[30] screened depression results indicating that 50% of her homebound older adult population was taking antidepressants with only about 50% rating their treatment as effective or very effective. Despite high reported depression rates and indications of ineffective treatments, only 6.4% of those receiving Medicare home health benefits were given depression diagnosis codes for follow up by home health professionals.[12]

Other characteristics associated with homebound older adults consistent with other research studies included older age or those under 64 years and poorer health (i.e., more chronic conditions, more prescription drugs and more hospitalizations).[13,15,16,18,19] Those under 64 years, who by definition are disabled to qualify for Medicare benefits, comprised only 6% ($n = 302$) of the homebound older adult population, and thus too small to study separately, were nevertheless included in our study since this subgroup is often found to be at high risk for depression and high health care spending.[10,25] Gender and race were less predictive in our population than health status. Few variables were protective: fewer prescription drugs (an indicator of better health) and high health literacy (perhaps an indicator of an awareness and engagement in one's health and aging progression).

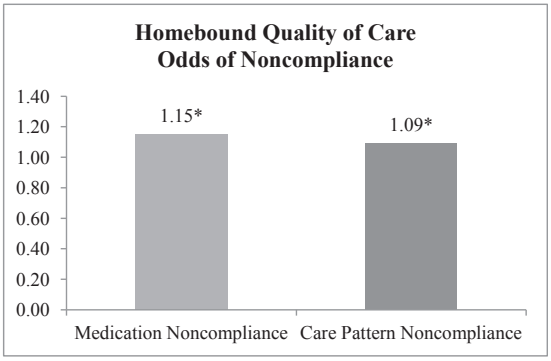

Fig. 1. Homebound quality of care: medication and care pattern noncompliance. *<0.001. Noncompliance with evidence-based recommendations for medication adherence and patterns of care for 10 common chronic conditions.

The homebound older adult population experienced significantly higher utilization of emergency room visits (22% increased) and inpatient admissions (57% increased) compared to non-homebound. Increased utilization resulted in significantly higher health care expenditures (medical and prescription drug) as paid by Medicare, Medicare Supplement and patient out-of-pocket copayments in the first year post enrollment. Per member per month expenditures were 35% higher ($491 pmpm higher) for homebound compared to non-homebound. These results are measured from medical and drug administrative claims databases and are in line with self-reported past hospitalizations and emergency room use[24] as well as documentation that homebound older adults are among the most expensive subgroups of Medicare beneficiaries.[25]

Member-level quality of care measures showed a lack of care coordination and fragmented health care services. Homebound older adults were 15% more likely to be noncompliant with medication adherence and 9% more likely to be noncompliant with care patterns (e.g., annual physician visits, diabetic eye and foot exams, lipid panels). While other studies have indicated that homebound older adults are less compliant with treatment protocols,[21,22] we could find no studies that actually measured levels of noncompliance for either medication adherence or recommended patterns of follow-up care.

Interventions delivered to homebound older adults have been hampered by resource limitations requiring in-person delivery to the home.[3,9] In our population of homebound older adults, about 25% met eligibility criteria scored from the survey for existing care coordination programs (i.e., intensive health needs for selected chronic conditions; data not shown). New technologies focused on tele-health communications through computers or tablets have allowed personal communications and interventions, such as problem-solving therapies, to be delivered to homebound older adults.[9–11,31] Many of the current interventions are focused on screening and therapies for depression and mental health issues since those aspects of homebound older adult needs are underserved by home health care agencies.[9–11,31] While homebound older adults have been characterized by mobility levels with documented advantages of encouraging walking outdoors, to date, no programs have attempted to address preventive strategies—maintaining or improving mobility levels.[32,33] Despite these efforts, most interventions currently being tested are research studies involving small sample sizes with limited generalizability.

Our study of new enrollees to AARP Medicare Supplement plans may not generalize to current Medicare or Medicare Supplement

beneficiaries. While response rates were about 50% among new enrollees, these individuals were younger (63.3% 65–69 years) and, consequently, were healthier than more general Medicare Supplement insureds and thus may underestimate the true prevalence of homebound older adults within Medicare Supplement populations. The questions used to screen for homebound older adults' ambulatory disabilities were consistent with Medicare disability criteria but did not include medical, injury or need for skilled care that more recently (November, 2013) have been added. Thus, our definition of homebound, while consistent, focuses on ambulatory disabilities and may not qualify all of these individuals for Medicare benefits. The short screening survey did not include hearing impairment, social isolation or loneliness questions, which may have provided additional insight into the needs of this population. Strengths of the study include the large study population with a high response rate to the screening survey, resulting in a measured prevalence rate for homebound older adults that should be representative of new enrollees to AARP Medicare Supplement plans. In addition, medical utilization and quality of care outcomes were measured from claims administrative databases. The level of ambulatory disabilities among younger Medicare/Medicare Supplement populations warrants further investigation and considerations for targeted interventions/programs for this vulnerable population.

Conclusions

Homebound older adult populations with mobility restrictions comprised almost 20% of new enrollees to AARP Medicare Supplement plans. These individuals were characterized by having high rates of self-reported memory loss, being older, having more chronic conditions, taking more medications and having high rates of past hospitalizations. All of these characteristics are associated with aging, thus as the Medicare population ages, we can expect a higher prevalence of homebound older adults. Homebound older adults had higher utilization rates of emergency room visits and inpatient admissions resulting in significantly higher health care expenditures during the first year post enrollment. Furthermore, homebound older adults demonstrated higher rates of noncompliance to medication adherence and evidence-based patterns of care recommended for their multiple chronic conditions. Screening for homebound older adults may be warranted, along with coordination with home health care agencies to better serve both the physical and mental health needs and thus improve overall quality of life of this vulnerable population.

References

1. Qui WQ, Dean M, Liu T, et al. Physical and mental health of the homebound elderly: an overlooked population. *J Am Geriatr Soc*. 2010;58:2423–2428.
2. Choi NG, Sirey JA, Bruce ML. Depression in homebound older adults: recent advances in screening and psychosocial interventions. *Curr Transl Geriatr Exp Gerontol Rep*. 2013;2:16–23.
3. Davitt JK, Gellis ZD. Integrating mental health parity for homebound older adults under the Medicare home health care benefit. *J Gerontol Soc Work*. 2011;54:309–324.
4. Tanner EK, Martinez IL, Harris M. Examining functional and social determinants of depression in community-dwelling older adults: implications for practice. *Geriatr Nurs*. 2014;35:236–240.
5. Vu LN, Dean MJ, Mwamburi M, et al. Executive function and mortality in homebound elderly adults. *J Am Geriatr Soc*. 2013;61:2128–2134.
6. Centers for Medicare and Medicaid Services. Medicare and Medicaid Supplemental Statistics, 2013 Edition. Table 7.2 Persons Served, Visits, Visit Charges and Program Payments for Medicare Home Health Agency Services: Calendar Year 2012. Available at: http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareMedicaidStatSupp/Downloads/2013_Section7.pdf#Table7.2; Accessed 17.03.15.
7. Centers for Medicare and Medicaid Services. Medicare benefit policy manual chapter 7-home health services. Accessed 24.03.15, https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/bp102c07.pdf; Revised January 14, 2014.
8. Li LW, Conwell Y. Effects of changes in depressive symptoms and cognitive functioning on physical disability in home care elders. *J Gerontol*. 2009;64A:230–236.
9. Choi NG, Lee A, Goldstein M. Meals on Wheels: exploring potential for and barriers to integrating depression intervention for homebound older adults. *Home Health Care Serv Q*. 2011;30:214–230.
10. Choi NG, Marti CN, Bruce ML, et al. Six-month postintervention and disability outcomes of in-home telehealth problem-solving therapy for depressed, low-income homebound older adults. *Depress Anxiety*. 2014;31:653–661.
11. Choi NG, Wilson NL, Sirrianni L, et al. Acceptance of home-based telehealth problem-solving therapy for depressed, low-income homebound older adults: qualitative interviews with participants and aging-service case managers. *Gerontologie*. 2014;54:704–713.
12. Shao H, Peng TR, Bruce ML, et al. Diagnosed depression among Medicare home health patients: national estimates of prevalence and key characteristics. *Psychiatr Serv*. 2011;62:538–540.
13. Wajnberg A, Ornstein K, Zhang M, et al. Symptom burden in chronically homebound individuals. *J Am Geriatr Soc*. 2013;61:126–131.
14. US Census Bureau Table 35. *Persons 65 years and over—living arrangements and disability status*. Statistical Table Based on data from the 2009 American Community Survey. Available at: http://www.census.gov/compendia/statab/2012/tables/12s0035.pdf; 2009. Accessed 17.03.15.
15. Cohen-Mansfield J, Shmotkin D, Hazan H. The impact of homebound status in older persons. *J Am Geriatr Soc*. 2010;58:2358–2362.
16. Cohen-Mansfield J, Shmotkin D, Hazan H. Homebound older persons: prevalence, characteristics and longitudinal predictors. *Arch Gerontol Geriatr*. 2012;54:55–60.
17. Fujita K, Fujiwara Y, Chaves PHM, et al. Frequency of going outdoors as a good predictors for incident disability of physical function as well as disability recovery in community-dwelling older adults in rural Japan. *J Epidemiol*. 2006;16:261–270.
18. Beck RA, Arizmendi A, Purnell C, et al. House calls for seniors: building and sustaining a model of care for homebound seniors. *J Am Geriatr Soc*. 2009;57:1103–1109.
19. Golden AG, Qiu D, Roos BA. Medication assessments by care managers reveal potential safety issues in homebound older adults. *Ann Pharmacother*. 2011;45:492–498.
20. Martens P, Fransoo R, Burland E, et al. Prevalence of mental illness and its impact on the use of home care and nursing homes: a population-based study of older adults in Manitoba. *Can J Psychiatry*. 2007;52:581–590.
21. Modin S, Furhoff AK. Care by general practitioners and district nurses of patients receiving home nursing: a study from suburban Stockholm. *Scand J Prim Health Care*. 2002;20:208–212.
22. Brenes G, Buralnick J, Williamson J, et al. The influence of anxiety on the progression of disability. *J Am Geriatr Soc*. 2005;53:34–39.
23. Leff B, Carlson CM, Saliba D, et al. The invisible homebound: setting quality-of-care standards for home-based primary and palliative care. *Health Aff*. 2015;34:21–29.
24. Choi NG, Marti CN, Bruce ML, et al. Relationship between depressive symptom severity and emergency department use among low-income, depressed homebound older adults aged 50 and older. *BMC Psychiatry*. 2012;12:233–243.
25. Aldridge MD, Kelly AS. *Epidemiology of serious illness and high utilization of health care*. In: *Institute of Medicine. Dying in America: Improving Quality and Honoring Individual Preferences Near the End of Life*. Washington (DC): National Academies Press; 2014 [Appendix E].
26. Kaiser Family Foundation. *Medigap: Spotlight on Enrollment, Premiums, and Recent Trends*, http://kaiserfamilyfoundation.files.wordpress.com/2013/04/8412-2.pdf; April, 2013. Accessed 05.11.14.
27. Wallace LS, Rogers ES, Roskos SE, et al. Screening items to identify patients with limited health literacy skills. *J Gen Intern Med*. 2006;21:874–877.
28. Cameron AC, Trivedi PK. *Regression Analysis of Count Data*. 2nd ed. New York: Cambridge University Press; 1998.
29. Setter SM, Neumiller JJ, Weeks DL, et al. Screening for undiagnosed cognitive impairment in homebound older adults. *Consult Pharm*. 2009;24:299–305.
30. Choi NG, Bruce ML, Sirrianni L, et al. Self-reported antidepressant use among depressed, low-income homebound adults: class, type, correlates and perceived effectiveness. *Brain Behav*. 2012;2:178–186.
31. Sheeran T, Rabinowitz T, Lotterman J, et al. Feasibility and impact of telemonitor-based depression care management for geriatric homecare patients. *Telemed J E Health*. 2011;17:620–626.
32. Kono A, Kanagawa K. Characteristics of homebound elderly by mobility level in Japan. *Nurs Health Sci*. 2001;3:105–111.
33. Simonsick EM, Guralnik JM, Volpato S, et al. Just get out the door! Importance of walking outside the home for maintaining mobility: findings from the Women's Health and Aging Study. *J Am Geriatr Soc*. 2005;53:198–203.